3

USING THE MMC, TASK SCHEDULER, AND CONTROL PANEL

After reading this chapter and completing the exercises, you will be able to:

♦ Describe the versatility of the Microsoft Management Console (MMC)

♦ Create your own custom MMC consoles

♦ Use the Task Scheduler to automate tasks

♦ Understand and use the Control Panel applets

♦ Install and configure new hardware

♦ Create hardware profiles for changing system configurations

♦ Configure PC Cards and multiple displays

Efficient centralized control is a major theme in Windows 2000. Microsoft has reengineered its administration, configuration, and management interfaces to allow a single computer to be the control point for an entire network. This centralization of control allows complex administrative tasks to be accomplished faster with less effort. There are two main Windows 2000 tools in which this centralized control can be seen, namely, the Microsoft Management Console (MMC) and the Task Scheduler. This chapter explores both of these advanced tools.

The Control Panel is where most of the hardware, device, driver, and service control utilities (applets) reside. Windows 2000 offers a wide range of Control Panel applets, some from Windows NT, some from Windows 98, and others created to support new technologies. This chapter also takes a look at these utilities, and how they can be used to install and configure hardware.

MICROSOFT MANAGEMENT CONSOLE OVERVIEW

The **Microsoft Management Console (MMC)** is a graphical interface shell that provides a structured environment for centralized management through consoles, snap-ins, and extensions. A **console** is like a document window, providing access to a set of administrative controls; one or more consoles can be loaded into the MMC. A **snap-in** is a component that adds control mechanisms to a console to manipulate a service or object. Each console can host one or more snap-ins. Plus, each snap-in can support one or more **extensions** (specialized tools that add functionality to snap-ins). Each snap-in (and its related extensions) is designed to manipulate a specific service or type of object in the Windows 2000 local, remote, domain, or Active Directory environment. The MMC does not provide any management capabilities itself; it merely provides the interface mechanism and environment for system and object controls provided via the snap-ins and extensions.

The MMC was created to simplify administration of the Windows networking environment. Versions of the MMC are included with Internet Information Server (IIS) 4.0 and other products deployed on Windows 98 and Windows NT. However, MMC was not fully realized until the final release of Windows 2000.

The most beneficial feature of MMC is its flexibility. As a control framework that is fully extensible by independent software vendors, its capabilities are unbounded, while it retains ease of use and a common interface. Additionally, multiple snap-ins can be combined into a custom administration layout to suit each administrator's particular needs or responsibilities. No other management tool available offers this wide range of customization.

MMC settings and layout can be stored as an .msc file. This allows custom configurations of snap-ins and extensions to be reused later on the same computer or transferred to another system. The .msc file contains all of the windows currently open in the MMC. You can assign, grant, or restrict access to the .msc files (and the controls they offer) via system policies based on user, group, or computer. Thus, you can selectively and securely assign administrative tasks to nonadministrative users. (Users, groups, and policies are discussed in Chapter 5.)

The Console

The MMC itself is a fairly simple and straightforward interface. To open the MMC without a snap-in, just open the Start, Run window and enter MMC. A blank MMC is displayed (see Figure 3-1). There are really only two parts to the main MMC: the main menu bar and the console window display area. The main menu bar contains the Console, Window, and Help drop-down menus and a movable mini-icon bar with one-click shortcuts to common activities (New, Open, Save, and New Window). The console display area contains the console tree and details pane and functions just like any other Windows application that supports multiple document windows.
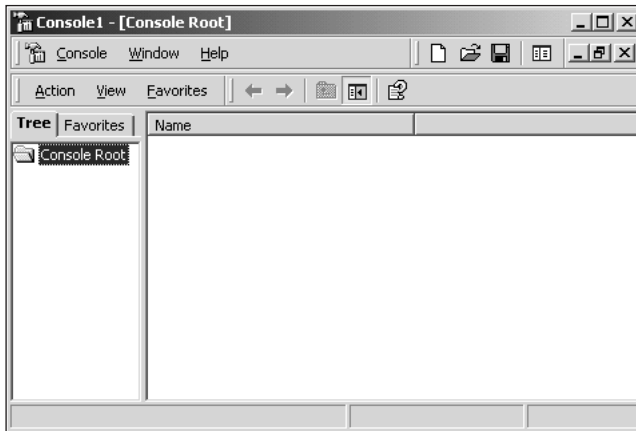
Figure 3-1   The MMC

The console menu bar contains the Action, View, and Favorites menus. The contents of these menus change according to the context of the snap-ins and extensions that are present and active in the console. The console menu bar also contains a mini-icon toolbar of one-click shortcuts to common functions found in the Action and View menus. The console tree is the left pane or division of the console display area (see Figure 3-2). This area lists the loaded snap-ins and extensions along with context selections (such as computers, domains, users, and divisions). The details pane is the right pane or division of the console display area. This area displays the details associated with the active item from the console tree.
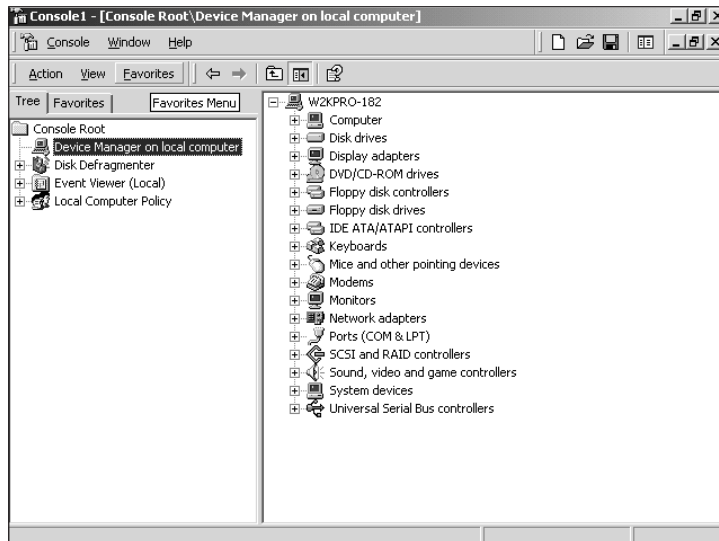

Figure 3-2   The MMC with snap-ins added

Snap-Ins and Extensions

Snap-ins are management tools added to a console to perform actions on services or objects. Microsoft sometimes refers to snap-ins as "standalone snap-ins," to distinguish them from extensions, which are actually a type of snap-in that adds functions to other snap-ins, but does not operate independently. Standalone snap-ins provide the main functions for system administration and control. A single extension can be used on any standalone snap-in with a similar service/object context. Multiple extensions can be present for a single snap-in. For example, the Computer Management snap-in can be extended by the Event Viewer and Device Manager extensions.

Once you've added and configured a console's snap-ins, you can save the console to an .msc file in one of four formats. The first and default format is **author mode**. This mode allows users to add and remove snap-ins, create new windows, view the entire console tree, and save new versions of the console. The other three formats are user mode formats. **User mode** does not allow end users to add or remove snap-ins or resave the console file. The three types of user mode formats are: Full Access, Limited Access/Multiple Windows, and Limited Access/Single Window. Full Access allows users to create new windows and view the entire console tree. The Limited Access formats prevent users from viewing portions of the console tree. Multiple Windows allows users to create new windows but not to close existing windows, and Single Window allows viewing of only one window. The format of the .msc file can be changed by an administrator via the Console, Options menu.

USING THE MMC

Windows 2000 is equipped with several preconfigured consoles designed to offer you administrative control over your system. These tools are found mainly in the Administrative Tools menu (Start, Programs, Administrative Tools, or Start, Settings, Control Panel, Administrative Tools).

> **TIP** If the Administrative Tools menu does not appear, perform the steps outlined in Hands-on Project 1-5 to make it visible.

The tools found here are:

- *Component Services*: Administers COM applications
- *Computer Management*: Controls disks and contains additional tools that manage local and remote computers
- *Data Sources (ODBC)*: Manages the addition, removal, and configuration of Open Database Connectivity (ODBC) databases and drivers
- *Event Viewer*: Provides an interface for monitoring and troubleshooting messages from Windows and other applications

- *Local Security Policy*: Manages local security policies, such as user rights and audit policies

- *Performance*: Provides graphs of system performance; also sets up data logs and alerts

- *Services*: Provides an interface to stop and start system services

- *Telnet Server Administration*: A DOS-based management interface for Telnet server settings and connections

These predefined consoles are stored in user mode, but the snap-ins used to create them are available to you to create your own custom consoles. (The Windows 2000 Professional pre-defined consoles are explored in the Hands-on Projects at the end of this chapter.) In addition to these predefined consoles, when you install other services or applications they may add other consoles for their custom or unique controls.

> **TIP** Windows 2000 Professional and Windows 2000 Server have different predefined consoles.

Creating custom consoles is simple. Just launch the MMC via the Start, Run command. Then use the Add/Remove Snap-In command from the Console menu to open the Add/Remove Snap-in dialog box. Click on the Add button to view the Add Standalone Snap-in dialog box (see Figure 3-3). Select the snap-in, and click Add. If the snap-in supports both local and remote operation, you'll be prompted to indicate whether to pull data locally or from a remote system. (Complete instructions for creating a custom console are given in Hands-on Project 3-1.)
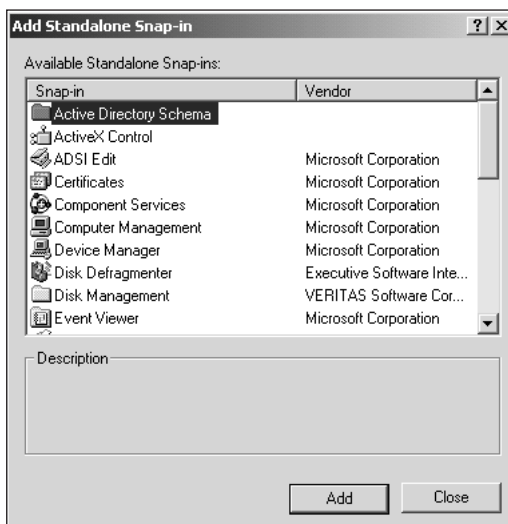

Figure 3-3   The Add Standalone Snap-in dialog box

The snap-ins available by default on a Windows 2000 Professional system are as follows:

- *ActiveX Control*: Allows you to add ActiveX controls to a number of categories, including 3D Direct Transform, Active Scripting Engine, Automation Objects, Document Objects, Embedable Objects, and Internet Explorer Browser Communication Band

- *Certificates*: Manages certificates for yourself, a service, or a computer

- *Component Services*: Points to the Component Services management tool from the Control Panel

- *Computer Management*: Points to the Computer Management tools from the Control Panel

- *Device Manager*: Allows you to view the hardware devices installed on your system and configure their properties

- *Disk Defragmenter*: Points to the Windows 2000 Disk Defragmenter

- *Disk Management*: Points to the Disk Management utility

- *Event Viewer*: Points to the event management utility that displays system event logs

- *Fax Service Management*: Manages faxes and fax devices

- *Folder*: Adds a folder to manage from within the MMC

- *Group Policy*: Manages group policy objects

- *Indexing Service*: Searches files and properties

- *IP Security Policy Management*: Administers Internet Protocol Security (IPSec) policies for secure communications

- *Link to Web Address*: Provides a link to a Web site of your choice

- *Local Users and Groups*: Administers local users and groups

- *Performance Logs and Alerts*: Provides an interface to set up performance logs and alerts

- *Removable Storage Management*: Manages removable storage devices

- *Security Configuration and Analysis*: Manages security configurations for computers using security template files

- *Security Templates*: Edits security template files

- *Services*: Provides an interface for configuring, stopping, and starting system services

- *Shared Folders*: Provides an interface to view information about shared folders, current sessions, and open files

- *System Information*: Provides information about the system for troubleshooting purposes

- *WMI Control*: Manages the Windows Management Instrumentation service

Some snap-ins can serve as standalone snap-ins or can be an extension to another snap-in (for example, the Device Manager or Event Viewer both can be either standalone snap-ins or extensions of other snap-ins such as Computer Management). Once you've added one or more snap-ins (that is, they appear in the list on the Add/Remove Snap-In dialog box), you can add or modify extensions by selecting the Extensions tab. Hands-on Project 3-1 explores the Computer Management snap-in extensions.

THE WINDOWS 2000 TASK SCHEDULER

The **Task Scheduler** in Windows 2000 is an updated version of the scheduler service from Windows NT 4.0, used to automate the performance of programs or batch files at a certain time or when a certain system condition occurs. The most obvious change is the presence of the Scheduled Tasks folder in the Control Panel. This folder gives you quick GUI access to all of the features of task scheduling. You don't have to rely on the text-only AT command interface or the WINAT GUI Resource Kit tool, as you did in Windows NT 4.0.

Tasks can be scheduled to run at a specific time, repeat at intervals, and launch with specific user credentials. The Add Scheduled Task Wizard, which appears in the Scheduled Tasks folder, walks you step by step through the scheduling process. (Try using this wizard in Hands-on Project 3-2.) Once a task is defined, you can edit and alter its scheduled properties by right-clicking the item and selecting Properties from the menu. The task Properties dialog box has four tabs. The Task tab (see Figure 3-4) lists the execution path and filename, the start-up directory, user account context, and whether the task is enabled. The Schedule tab (see Figure 3-5) lists the time and date when the task will be launched (once, daily, weekly, monthly, at system startup, at logon, and when idle). The Advanced button on this tab allows you to define a termination period and whether to repeat the task at minute/hour intervals. The Settings tab lists whether to delete the task when complete (default is to retain task), whether to terminate the task if still active after a time period, minimal idle time before launch, and whether to stop the task if the system is running on batteries. The Security tab is used to define the access permissions to this object (that is, who can read or change the task).

> **TIP** Troubleshooting the Task Scheduler involves verifying the settings of each defined task. Most often, the cause of a task not running when expected is an incorrect time/date setting. You should also check the path for the tool/script/program to be launched as well as any advanced settings dealing with idle time and repeat executions. Double-checking your work is the best method to eliminate programming errors when scheduling tasks.
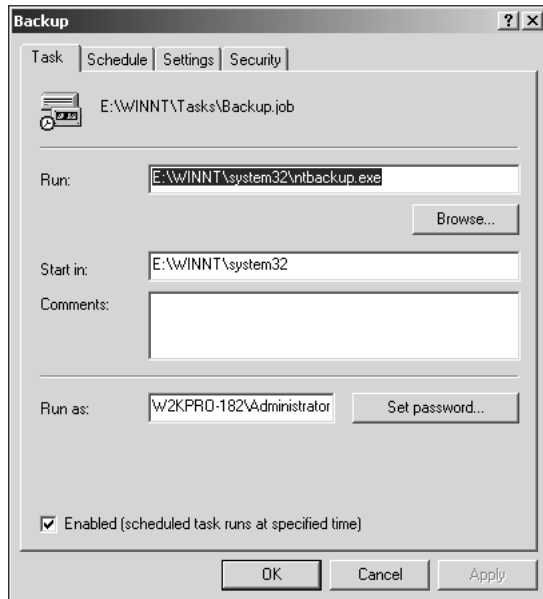
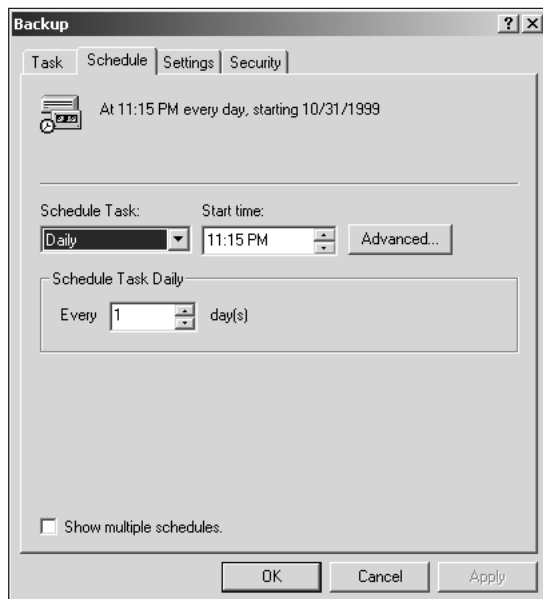**Figure 3-4**   The Scheduled Task Properties dialog box, Task tab

Figure 3-5   The Scheduled Task Properties dialog box, Schedule tab

Scheduled tasks can be moved from system to system. This allows you to define administrative actions or batch files on a single computer, then place them on client systems from a central location.

CONTROL PANEL OVERVIEW

The Windows 2000 **Control Panel** (shown in Figure 3-6) hosts the **applets** (tools or utilities) used to install and configure **devices** (internal or external physical computer components) and software (particularly operating system **services**, such as print spooling, remote access, or user access to network resources). There are several basic applets that appear in the Control Panel, and other applets may be added depending on the services, components, or applications installed with Windows 2000. The common Control Panel applets are discussed in the following sections.

Figure 3-6   The Windows 2000 Control Panel

Accessibility Options

You can enable and fine-tune special interface features for the visually impaired, hearing impaired, or movement impaired in the Accessibility Options applet. There are five tabs in this applet. The Keyboard tab is used to configure the following:

- *StickyKeys*: Enables the use of Ctrl, Shift, and Alt by pressing once instead of requiring the user to hold them down

- *FilterKeys*: Used to ignore quick or repeated keystrokes

- *ToggleKeys*: Plays a tone when Caps Lock, Scroll Lock, or Num Lock keys are pressed

The Sound tab of the Accessibility Options applet is used to configure SoundSentry and ShowSounds. SoundSentry displays visual cues when the system plays a sound, such as flashing a title bar, window, or the desktop. ShowSounds is used to force the display of captions when sounds or speech are played.

The Display tab sets the display to a high contrast color scheme to improve readability. The options include black on white, white on black, or any defined color scheme (via the Display applet's Appearance tab, or via the Settings button on the Display tab of the Accessibility Options applet).

The Mouse tab is used to enable numeric pad control of mouse movements. When enabled, the arrows on the numeric keypad control the direction of mouse insertion point movement. The settings include speed and acceleration of the pointer.

The General tab is used to set the following controls:

- Disable or turn off accessibility options after the system is idle for a specified length of time
- Display a warning when enabling accessibility options
- Play a sound when turning a feature on or off
- Enable support for serially connected key devices
- Apply all settings to logon desktop and/or to new users

Configuring Accessibility Options is simply a matter of enabling or disabling each offered feature on the various tabs and fine-tuning these features by selecting the optional settings that offer you the most help interacting with the system. Troubleshooting Accessibility Options is handled in the same manner as the initial configuration: walk through the tabs and the configuration settings of each feature to make sure the desired settings are selected. If the accessibility option involves a device such as a special keyboard, mouse, etc., check that the driver for that device is up to date, or check with the vendor for additional troubleshooting tips. Sometimes the problem may be with the I/O device and not with the Windows 2000 accessibility options.

Add/Remove Hardware

The Add/Remove Hardware applet is actually a **wizard** (see Figure 3-7). It is used to add a new device, troubleshoot a device that is not functioning properly (these first two functions are part of the same process), or remove an existing device. This wizard is extremely easy to use and very informative. This tool makes adding new devices to Windows 2000 as easy as working with Windows 98.

When adding new hardware, the wizard first searches for **Plug and Play** devices. If any are found, it attempts to locate and install **drivers**. If no new Plug and Play devices are found, it prompts you for the type of device you are installing. This prompt consists of a list of existing devices and drivers that are loaded or known. This list displays an icon by each item. Functioning items have an icon that represents their function (mouse, monitor, NIC, etc.). Nonfunctioning items have either a yellow exclamation point or a stop sign to indicate problems. You can select one of these nonfunctioning items to replace the driver, to attempt a solution (that's the troubleshooting part of this process) or select the Add a new device option to install a driver for a new device. Drivers can be loaded either from the distribution CD, from a manufacturer's CD or floppy disk, or via the Microsoft Update utility.
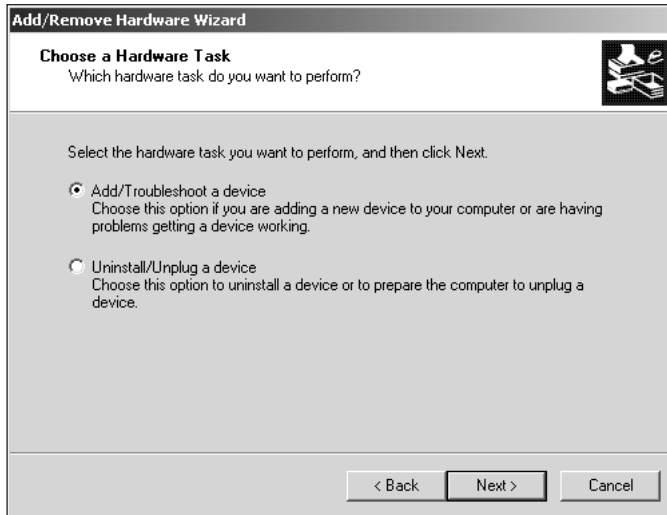
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Figure 3-7 The Add/Remove Hardware applet

The Add/Remove Hardware wizard is the best place to start when installing DVD players, CD players, tape devices, scanners, modems, network interface cards, multimedia devices, video devices, smart card readers, cameras, IrDA (Infrared Data Association) devices, wireless devices, and USB devices. As already mentioned, in many cases, Windows 2000 Plug and Play will automatically detect new hardware components and attempt to install drivers for them. However, when devices are not automatically detected or the drivers fail to install, you can employ the Add/Remove Hardware applet to install the drivers for the device.

> **TIP** Always check with the vendor, often via their Web site, for the latest drivers for their devices.

Once a device is installed, it can be configured and managed through the Device Manager. This tool is accessed via the Computer Management tool set from the Administrative Tools in the Control Panel. The Device Manager is used to alter device settings, update drivers, add/remove a device from a hardware profile, and to verify functionality of a device. See the "Installing Hardware" section later in this chapter for more information on configuring and managing devices with the Device Manager, and try Hands-on Project 3-8. Troubleshooting any device is a matter of verifying that the proper driver is installed and that the correct settings for the device are made. Both of these items can be verified through the Device Manager. Furthermore, the Device Manager can be used to update, replace, or remove drivers for installed devices. This is accomplished using the Uninstall or Update buttons on the Drivers tab of a device's Properties dialog box from the Device Manager.

To remove a device from your system, you can select one of two removal methods: uninstall or unplug/eject. The uninstall option completely removes the driver from the system. Thus, to regain access to the device later (or after you've physically reinstalled it), the driver for the device must be reinstalled. The unplug/eject option simply temporarily stops the device from being used by the system. This option is often used with removable media drives (such as Jaz or Zip drives), **docking stations** (expansion devices for notebook computers), and PC Cards (formally PCMCIA Cards, discussed later in this chapter).

Add/Remove Programs

The Add/Remove Programs applet is actually three tools in one. First, it can be used to change or remove installed applications. In this mode, it displays installed applications, their drive space usage, and how often the application is actually used. You can select the change option (if the application's own setup routine offers a partial or optional setup method) or remove the application. The second tool (see Figure 3-8) installs new applications from a vendor-supplied distribution floppy disk or CD or from the Microsoft Update site. The third tool (see Figure 3-9) is the Add/Remove Windows Components Wizard. You can add or remove Windows 2000 components through this wizard/tool.
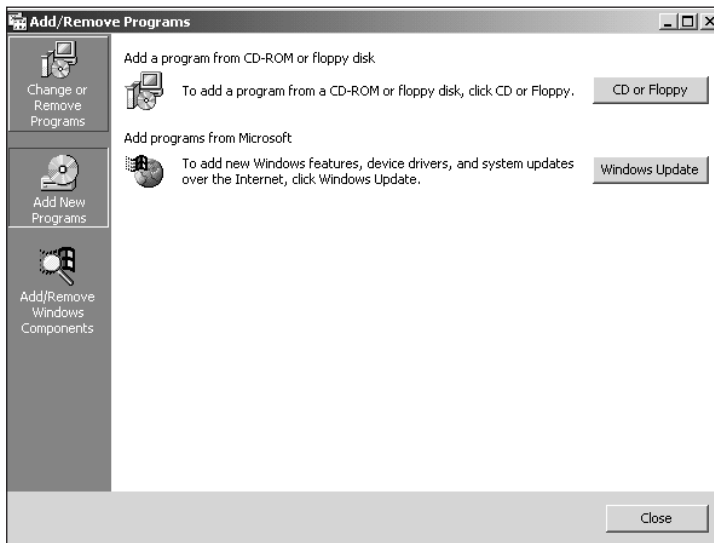

Figure 3-8   The Add/Remove Programs applet, Add New Programs selection
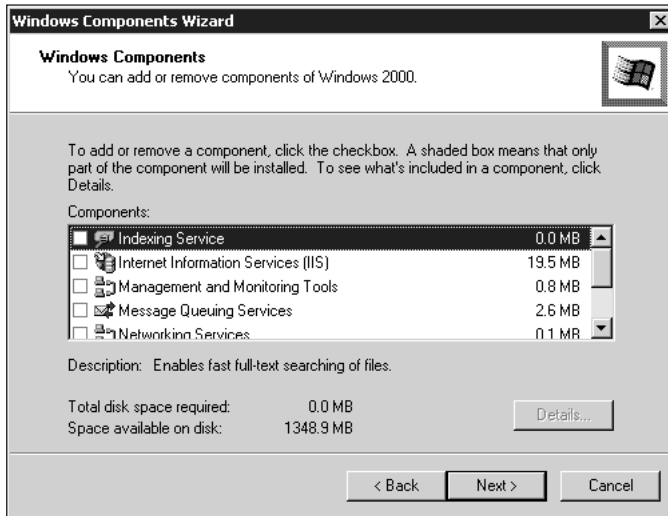
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Figure 3-9 The Add/Remove Programs applet, Add/Remove Windows Components selection

Administrative Tools

The Administrative Tools item is actually a folder pointing to the same place as the Administrative Tools item in the Start menu. The contents of this menu were briefly discussed in the "Using the MMC" section earlier in this chapter.

Date/Time

The Date/Time applet is used to set the calendar date, clock time, and time zone for the system. On the Date & Time tab, you can set the month and year from pull-down lists and select the day from the displayed month calendar. Time is adjusted by highlighting the hour, minute, second, and AM/PM, and either using the scroll buttons or typing in a new value. When you set the time, the timer clock is set directly on the system's BIOS. The Time Zone tab displays a world map and a pull-down list from which you can select time zones. Time zone information is stored internally as either a negative or a positive offset to Greenwich Mean Time. This also supports automatic updates for daylight-saving time and standard time, in those areas where such seasonal time changes occur.
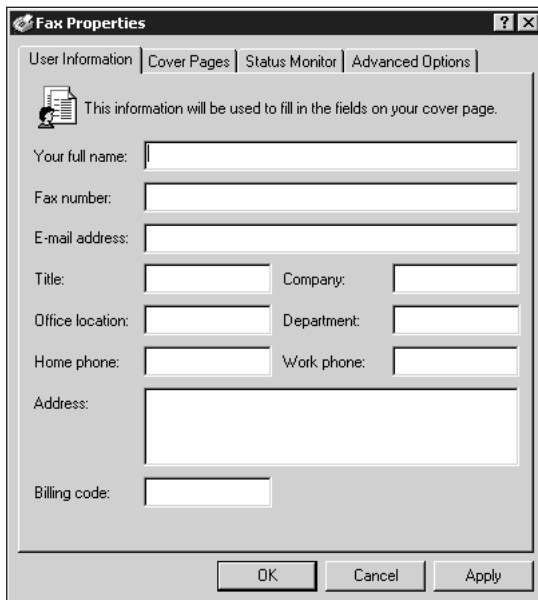
Display

The Display applet is used to choose from a wide range of interface changes and preference settings. The display properties also can be accessed by right-clicking the mouse button on any blank area of the desktop and selecting Properties from the pop-up menu. There are six tabs to this applet. The Background tab is used to select the wallpaper graphic and indicate whether to center, tile, or stretch the image. The Screen Saver tab is used to set the screen saver, define the idle period before launching the screen saver, and set the energy-saving features of the

monitor (the Screen Saver tab links to the Power Options applet, where all power features are configured). The Appearance tab is used to set the color scheme; each element of the display, from fonts to scroll bars to active windows, can be configured to your color preferences. The Web tab is used to enable/disable the display of Web content on the Active Desktop and to define the elements displayed. The Effects tab is used to set the common desktop icons and visual effects, such as menu transition effects, font smoothing, and showing window contents while dragging. The Settings tab is used to set the screen resolution and color depth. There are also buttons to aid in troubleshooting and setting adapter- or monitor-specific settings. The Troubleshoot button leads you to the Windows 2000 Display Troubleshooter. From within this applet, you can answer a series of questions that may help you find a resolution to any problems you may be experiencing. The Advanced button opens the five-tabbed Monitor and Video Adapter dialog box. From this dialog box, you can configure font size, settings for how Windows 2000 responds to setting changes, adapter properties, monitor properties, graphics acceleration, and color management.

Fax

The Fax applet is used to configure the fax capabilities of Windows 2000. Basic fax capabilities supported over a fax/modem allow Windows 2000 users to send and receive faxes. This applet is used to configure user information (see Figure 3-10), define cover pages, set monitor status, and access advanced functions (open the Fax Management Console and add a new fax printer).

Figure 3-10   The Fax applet

Folder Options

The Folder Options applet accesses the same configuration interface as the Tools, Folder Options command from Windows Explorer. This applet is used to set the functional and visual parameters of the folders on the system. This applet has four tabs. The General tab is used to enable/disable Active Desktop, Web folders view, and open folder in new or current window, and to indicate whether a single- or double-click opens items. The View tab is used to configure advanced settings, such as show hidden files, hide file extensions, and launch folder windows in separate processes. The File Types tab is used to define or associate file extensions with applications. The Offline Files tab is used to enable offline network browsing by caching resources locally.

Fonts

The Fonts applet lists all currently installed fonts used by Windows 2000. Additional fonts can be added and unused fonts can be removed through this interface. Unfortunately, to see a sample of a font's output still requires a word-processing application with print preview capabilities or actually printing a document.

Game Controllers

The Game Controllers applet is used to install and configure the operations of joysticks and other specialized gaming controls that may be attached to sound cards or serial ports. This interface offers access to device-specific properties and troubleshooting aids.

Internet Options

The Internet Options applet (see Figure 3-11) is used to define settings for Internet Explorer and general Internet access. This applet has six tabs. The General tab sets the home page, temporary file cache, URL history, colors, fonts, languages, and accessibility options. The Security tab defines the security level for four Web zones. The security level determines whether software is automatically downloaded, form data is submitted, or cookies (text scripts that a Web browser sends to a server to customize a user's browsing experience) are used. The Content tab is used to configure the Content Advisor (a content-based site blocker), identity certificates, AutoComplete, and your online identity. The Connections tab is used to define how IE (Internet Explorer) and other online tools access the Internet via a network connection or DUN (Dial-Up Networking), often used for home Internet service connections. The Programs tab is used to define which helper applications are used for HTML editing, e-mail, newsgroups, Internet calls, calendar, and contacts. The Advanced tab is used to set advanced features, such as browsing functions, HTTP 1.1, Microsoft VM (virtual memory), multimedia, printing, searching, security, and accessibility.

> **TIP**   For details on configuring Internet Explorer, please consult the IE Help file or the IE Web site at *http://www.microsoft.com/windows/ie/default.htm.*
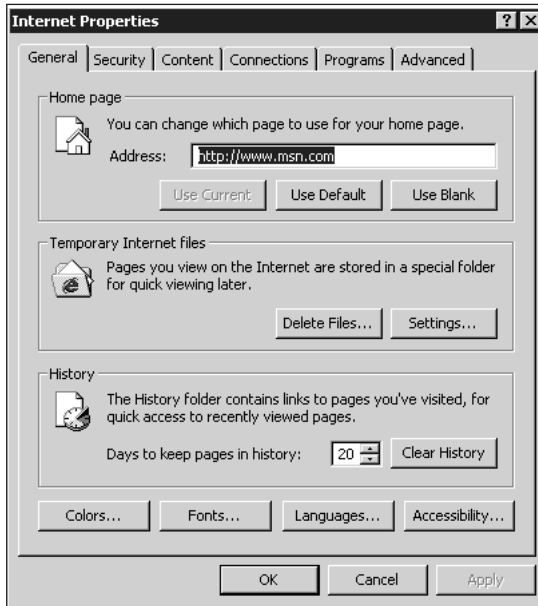
Figure 3-11   The Internet Options applet

Keyboard and Mouse

The Keyboard applet is used to modify how the keyboard functions. Settings include the repeat delay, repeat rate, insertion point blink rate, and language used. The Mouse applet is used to modify how the mouse functions. Settings allow you to switch the functions of left and right buttons, choose single- or double-click to open, indicate how quickly to double-click, choose the graphics used for pointers, indicate how the pointer moves (speed and acceleration), and choose to snap to objects (that is, when the pointer moves to the general vicinity of an object, it selects the object it is near).

Network and Dial-up Connections

The Network and Dial-up Connections applet is used to create and control network settings for both LAN and RAS links.

Phone and Modem Options

The Phone and Modem Options applet is used to define dialing locations, install and configure modems, and configure RAS (Remote Access Service) and TAPI (Telephony Application Programming Interface) drivers and services.

Power Options

The Power Options applet (see Figure 3-12) is used to set the system's power-saving features. Several power schemes are predefined, such as Home/Office Desk, Portable/Laptop, Presentation, Always On, Minimal Power Management, and Max Battery. Each of these schemes is designed with either power or use in mind. You can employ a predefined scheme or create your own. The two primary settings are Turn off monitor and Turn off hard disks after a specified length of time. Other advanced controls include displaying the Power Management icon in the icon tray, enabling hibernation, and indicating whether to enable Advanced Power Management (APM) and uninterruptable power supply (UPS) support.

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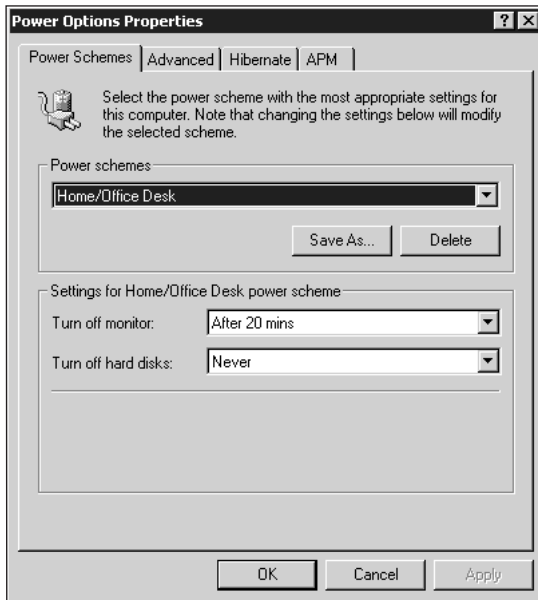
Figure 3-12   The Power Options applet

To configure the Advanced Power Management (APM), you need only select a predefined power scheme through the Power Options applet in the Control Panel. If you want a custom scheme, you can alter the monitor and hard disk timeout values and save those settings as a new power scheme. The four other tabs of the Power Options applet allow you to enable the power icon in the taskbar, allow hibernation, allow APM (an automated feature that reduces battery drain), and to configure a UPS.

Printers

The Printers applet is used to install, share, and configure printers. This applet is used for physical print devices as well as for specialized printers, such as fax machines. Once a printer is in use, this applet also grants access to the print queue for management purposes.

Regional Options

The Regional Options applet is used to define location-specific uses or requirements for numbers, currency, time, dates, and more. You can select a predefined regional scheme based on language or country, then define or customize specifics for numbers, currency (see Figure 3-13), time, and date.
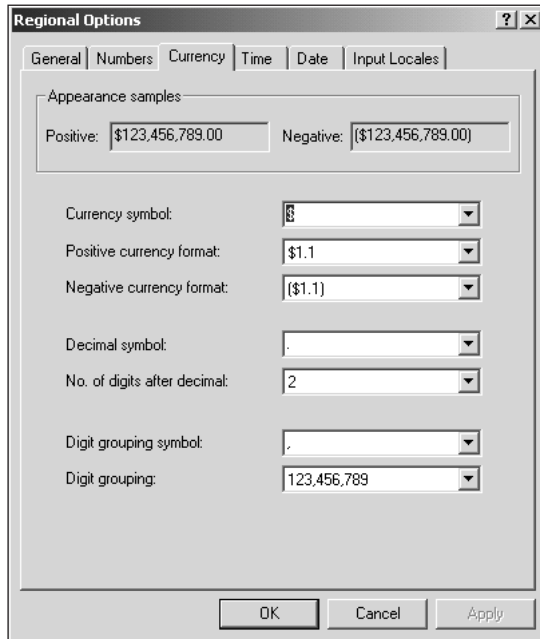

Figure 3-13   The Regional Options applet, Currency tab

To enable and configure multiple language support, you need to decide whether you only want the ability to read and write documents in multiple languages or if you actually need multiple input locales. An input locale is a combination of language and keyboard layout used to define how data is entered into the computer. To enable multiple languages for documents, just select additional languages on the General tab of the Regional Options applet. To enable multiple input locales, add them to the Input Locales tab and define the shortcut key sequence used to switch between them. Once multiple locales are defined, you can also switch between them using the locale indicator that appears in the icon tray of the task bar. (Try Hands-on Projects 3-9 and 3-10.)

The Numbers, Currency, Time, and Date tabs of the Regional Settings applet are used to define the local settings for the computer. These tabs offer controls based on country, region, and language so you can fully customize the interface's handling of these items for your needs or preferences.

Scanners and Cameras

The Scanners and Cameras applet is used to install drivers and configure digital cameras and optical scanners. Once present, these devices can be used with graphics and imaging software to create digital images of real-life or printed materials.

Scheduled Tasks

The Scheduled Tasks applet is used to automate task launching, such as automatic backups. This applet was discussed earlier in this chapter.

Sounds and Multimedia

The Sounds and Multimedia applet (see Figure 3-14) is used to customize the sound scheme (system events that cause sounds, such as program errors, emptying the Recycle Bin, or questions), setting of device preferences, and configuration or troubleshooting of multimedia-related services and drivers.
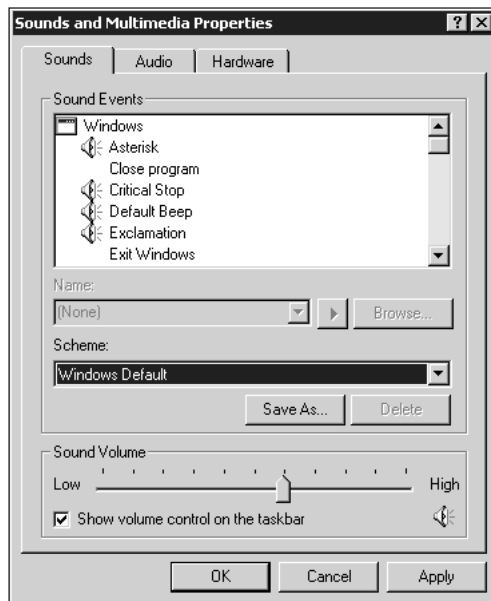
Figure 3-14   The Sounds and Multimedia applet, Sounds tab

System

The System applet (see Figure 3-15) is used to configure or control many system-level or core operational functions of Windows 2000. The System applet has five tabs. The General tab displays system version, registered user, and basic computer information. The Network Identification tab is used to join a domain/workgroup, create local users, and change the computer name. The Hardware tab is used to access the Add/Remove

Hardware Wizard (also an applet), enable/disable driver signing requirements (drivers that have been authenticated by Microsoft), access the Device Manager (Administrative Tools utility), and define hardware profiles. The User Profiles tab is used to create roaming profiles out of local profiles (see Chapter 5). The Advanced tab is used to define performance options (set optimization for applications or background services, and paging file settings), environmental variables, and startup and recovery options.

Driver Signing

Driver signing is used to identify drivers that have successfully passed the Microsoft Windows Hardware Quality Labs evaluations and tests. The configuration of driver signing through the System applet is used to warn users when a non-signed driver is being installed. Pressing the Driver Signing button on the Hardware tab of the System applet reveals the Driver Signing Options dialog box. This dialog box presents three radio buttons:

- *Ignore:* Install all files, regardless of file signature
- *Warn:* Display a message before installing an unsigned file
- *Block:* Prevent installation of unsigned files

Configuring driver signing involves selecting one of these three options. If you are an administrator, you are offered an additional checkbox of "Apply setting as system default" which makes the driver signing setting the same for all users. The only method of troubleshooting driver signing is to return to this dialog box and ensure that the correct item is selected according to your organization's needs or security policy.

Figure 3-15   The System applet

Virtual Memory

The Virtual Memory dialog box is accessed from the System applet, Advanced tab. Click the Performance button to display the Performance Options dialog box, then press the Change button to display the Virtual Memory dialog box (see Figure 3-16). The Virtual Memory dialog box controls how a Windows 2000 system uses a combination of physical RAM and disk space to create a pool of memory for system and application use when RAM is no longer available.

Virtual memory consists of the machine's actual physical RAM plus one or more **paging files** (Pagefile.sys) that reside on a physical disk attached to the system. The paging file acts like an extension to the system's RAM, which is why it's called virtual memory. Windows 2000 coordinates the swapping of special 4 KB data units between the paging file and RAM, where such units are called **memory pages**, or more simply, **pages**. The combination of memory pages in RAM and on disk creates a collection of pages called virtual memory, that allows a system to run more and larger applications at any given moment than a system's RAM might physically be able to accommodate. Administrators can change the size of the paging file to help optimize system performance. This usually involves increasing the values assigned to the initial and maximum sizes of this file, to give the system more room in which to operate.

The default paging file size for Windows 2000 should equal one and one-half times the amount of physical RAM. Thus, if a system incorporates 128 MB RAM, Setup creates a paging file of 192 MB. Microsoft suggests that if another drive is present on the machine, a paging file should not reside on the same physical disk as the Windows 2000 system files, to decrease disk contention between swapping memory pages and accessing system files. Moving the paging file off the boot partition makes it impossible to perform a memory dump.
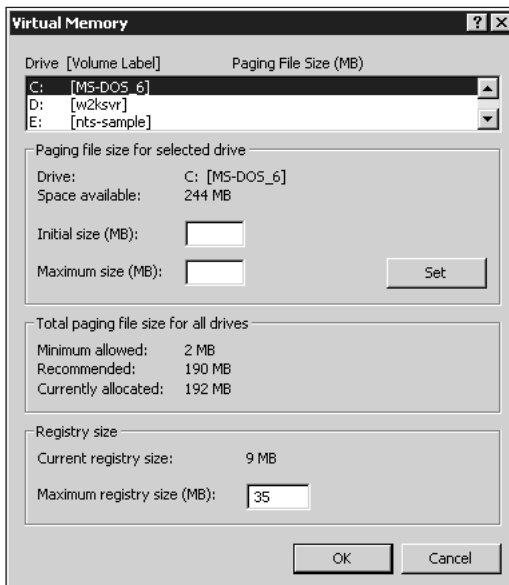

Figure 3-16   The Virtual Memory dialog box

Environmental Variables

The Environment Variables dialog box, which is accessed by clicking the Environment Variables button on the Advanced tab of the System applet, allows environmental variables, such as default operating system, number of processors, and default temp directory to be set. The top pane of the tab controls settings for system-wide environmental variables. The bottom pane controls local user environmental variables. Only a local user who is currently logged on can set variables on this tab. These variables are used to control how Windows 2000 operates, but particularly to control how older 16-bit Windows or DOS programs behave within the Virtual DOS Machines (VDMs) within which they must run in the Windows 2000 environment.

Startup and Recovery Options

The Startup and Recovery Options dialog box, accessed by clicking the Startup and Recovery button on the Advanced tab of the System applet, allows you to define system startup parameters and how STOP errors are handled. Startup controls occur in the region of this window labeled System Startup, and are used to set the default operating system and selection timer for the boot menu. The default is 30 seconds, but is often reduced to 5 or 10 seconds to speed system startup.

In this window, the options in the area labeled Recovery are a bit more esoteric. They provide special controls to deal with an outright Windows 2000 system crash. Normally, when a regular application fails, the application itself generates an error message to the event log, while dumping the contents of its address space to a file. When the whole 2000 system halts due to a STOP error, the entire contents of the computer's virtual memory are dumped to a .dmp file (which resides in the %systemroot% or \Winnt folder, by default). Although this dump file is of little use to ordinary users, and can usually be discarded, this information can be invaluable when you are debugging system or application problems. There are also options for writing an event to the system log, for sending administrative alerts, and for automatic rebooting of the system.

Users and Passwords

The Users and Passwords applet is used to create and manage local user accounts. This applet is also used to manage identity certificates (certificates are electronic documents that verify the identity of a client or server to ensure that sensitive information is not transmitted to an imposter) and group membership, and to determine whether the Ctrl+Alt+Delete keystroke is required to log on. This applet is discussed in detail in Chapter 5.

INSTALLING HARDWARE

Installing hardware under Windows 2000 is fairly straightforward. Upon bootup, the system polls the entire computer, looking for new devices. If they are found, Windows 2000 attempts to identify them. This will be successful for most Plug and Play devices and some non–Plug and Play devices. Windows 2000 will install drivers automatically or prompt you

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for an alternate source path for drivers. If new hardware is not detected, the Add/Remove Hardware Wizard can be used to manually install vendor-supplied drivers.

In either case, once a device driver is installed, you can verify that it is working properly via the Device Manager. This tool, accessed via the Device Manager button on the Hardware tab of the System applet, lists all installed and known devices and indicates their status. (You can also reach the Device Manager, shown in Figure 3-17, through the Computer Management administration tool by selecting Device Manager from the System Tools console tree.) A yellow exclamation point or a stop sign over a device's icon indicates problems or conflicts. The exclamation point generally indicates a conflict, whereas a stop sign generally indicates that the device is not functioning. By opening the properties of each problem device, you can access information about the nature of the problem, read troubleshooting recommendations, change device settings, or install/upgrade device-related drivers.

> **TIP** If a new device is not a Plug and Play device, then there is a good possibility that its current settings will conflict with existing hardware. If you want to add a device that isn't Plug and Play, it's always a good idea to find out what hardware resources are available. Then you can use this information to either preset the device (if jumpers and DIP switches are present) or configure the driver.
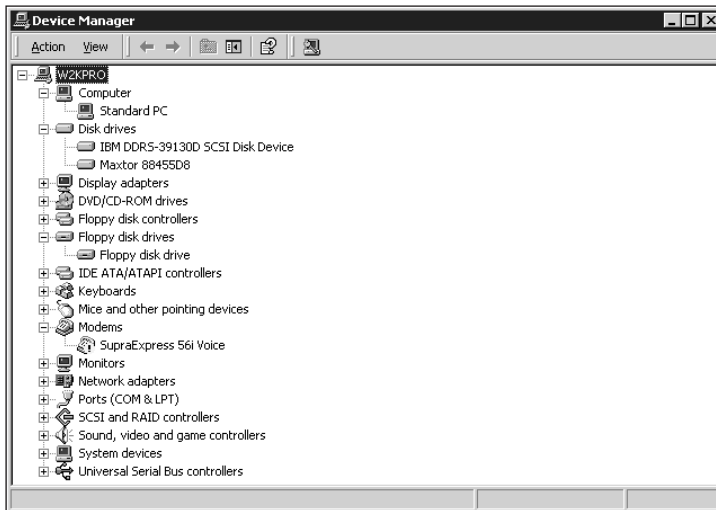
Figure 3-17 The Device Manager, Devices by Type

The four main areas of hardware resource conflict are:

- *interrupt request (IRQ)*: The IRQ level settings are used to halt CPU operation in favor of the device. Windows 2000 supports 16 interrupts, namely IRQ 0 through 15.

- *I/O port*: The I/O port setting defines the section of memory used by the hardware to communicate with the operating system. When an IRQ is used, the system

checks the I/O port memory area for additional information about what function is needed by the device. The I/O port is represented by a hexadecimal number, such as O3F8 – O3FF.

■ *direct memory access (DMA)*: DMA is a channel used by a hardware device to access memory directly—that is, bypassing the CPU. Windows 2000 supports 8 DMA channels, numbered 0 through 7.

■ *Memory*: This is the area of physical memory hosted by the motherboard that is used by a device to perform its operations. These memory areas are reserved and cannot be used by any other device or process on the system.

You can see the current state of these resources through the Device Manager by selecting Resources By Type (see Figure 3-18) or Resources By Connection from the View menu. Using the data presented, you can configure new hardware so that it does not conflict with any existing devices or drivers. Once a driver is installed, you may be able to alter its resource requirements via the device's Properties dialog box on the Resource tab.

To access this configuration area:

1. Open the **System** applet from the Control Panel.

2. Select the **Hardware** tab.

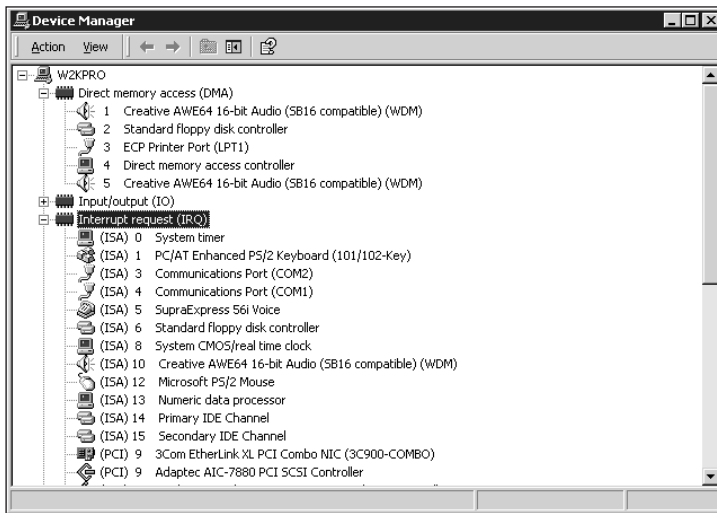3. Click the **Device Manager** button.

Figure 3-18 The Device Manager, Resources by Type

4. Locate the device in the list and select it.

5. Right-click over the device, and select **Properties** from the resulting menu.

6. Click the **Resources** tab (see Figure 3-19).

7. Click the **Set Configuration Manually** option if the Resource Settings are not displayed.
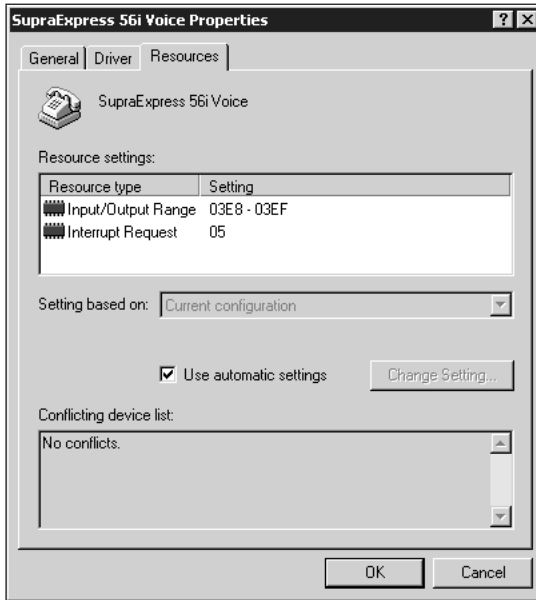
Figure 3-19 A device's Resources tab

REMOVABLE MEDIA

Removable media include any storage device, whether read-only, write-once, or rewriteable, that is installed onto a Windows 2000 system, such as tape devices, DVD and CD-ROM drives, optical drives, Zip or Jaz drives, Bernoulli devices, etc. If a device can be removed or inserted while the computer's power is on ("hot swapped"), then it is a removable device. Removable devices are installed in the same manner as any other device, using either Plug and Play at startup or the Add/Remove Hardware applet.

Once installed, removable media can be configured through the Device Manager. You can also manage the media (tape, disks, CD, DVD, and so on) through the Removable Storage tool found in the Computer Management tool accessed from Administrative Tools in the Control Panel. This tool lists all media present on the system and grants you the ability to create custom sets of media for backup or archival purposes. The Computer Management tool can be used to define the media type for each device, set permissions for the media device, and rename the media device. We recommend you explore the Removable Storage section of the Computer Management tool, especially if you are working with swappable media.

HARDWARE PROFILES

A **hardware profile** is similar to a user profile in that it is a collection of custom settings specific to a particular situation. In the case of user profiles, the situation is the user account used to log on to the system. In the case of hardware profiles, the situation is the conglomeration of hardware that currently makes up the computer (including both internal and external devices and network connections). A hardware profile is most often used on portable computers in which hardware configurations change often. Typically, a hardware profile is used either to enable or disable network support, modems, external monitors, and docking stations. However, hardware profiles can be employed anytime there is a hardware change between bootups, such as with removable media, PC Cards, disconnected peripherals, etc.

In most cases, hardware profiles are not strictly required on Plug and Play compatible systems. But most users find them more convenient and elegant than installing and removing drivers each time the system boots into a new hardware configuration. Basically, a hardware profile is simply a list of all installed devices with selections as to which devices are not enabled for a particular profile. For example, on a notebook computer used away from the office, a hardware profile could be used to disable networking hardware.

On a system with multiple hardware profiles defined, the system attempts to select the hardware profile that matches the discovered hardware (Windows 2000 performs a hardware system check during initial bootup). If a match cannot be determined (that is, an exact match is not found), then you will be prompted as to which hardware profile to use. Furthermore, you can select one profile as the default profile. When the system fails to locate a profile matching existing hardware, after the defined timeout period expires, the default hardware profile will be used.

Hardware profiles are created through the Hardware Profiles dialog box (see Figure 3-20). This dialog box is accessed by clicking the Hardware Profiles button on the Hardware tab of the System applet. Initially, there is only one hardware profile present, the current configuration with all known devices installed and enabled.

To create new profiles:

1. Select an existing hardware profile.
2. Click the **Copy** button.
3. Provide a name for the new profile, then click **OK**.
4. Reboot the computer.
5. While rebooting, select the new hardware profile if prompted.
6. Open the **Device Manager** (System applet, Hardware tab, Device Manager button).
7. For each device you want to remove from this hardware profile, open its **Properties** dialog box (right-click over the device and select **Properties** from the resulting menu).
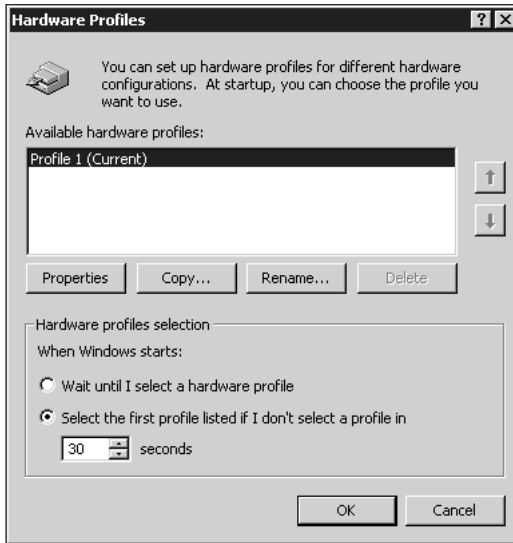
Figure 3-20   The Hardware Profiles dialog box

8. On the **General** tab of each device's Properties dialog box, change the Device Usage pull-down list to **Do not use this device (disable)**.

9. For each device you want to add back into this hardware profile, open its **Properties** dialog box (right-click over the device and select **Properties** from the pop-up menu).

10. On the **General** tab of each device's Properties dialog box, change the Device Usage pull-down list to **Use this device (enable)**.

11. When you have made all the desired changes, close the Device Manager.

Once you have two or more hardware profiles defined, you need to make two setting changes to the Hardware Profiles dialog box. First, select which profile should be the default. This is done by reordering the profiles so that the most often used or most common profile is at the top of the list. Reordering is accomplished by selecting a profile and using the up and down arrows on the dialog box to alter its position. Second, select whether to wait indefinitely for a hardware profile selection or to use the default if no selection is made after a specified time period. This setting only applies when the system cannot automatically determine which profile to use on the basis of discovered hardware.

PCMCIA OR PC CARDS

Windows 2000, being a fully Plug and Play compatible operating system, includes support for **PCMCIA (Personal Computer Memory Card International Association)** or **PC Cards**. These are credit-card sized devices that plug into a slot port found on most notebooks and some desktop computers. PC Cards can host many different types of devices, such as memory

expansions, SCSI (Small Computer System Interface) cards, NICs (network interface cards), modems, and proprietary peripheral interfaces. Most computers that support PC Cards have two slots, thus allowing up to two additional devices to be added to the system.

Unlike Windows NT and Windows 95/98, Windows 2000 does not have a PC Card (or PCMCIA) applet. Instead, it displays an Unplug Or Eject Hardware icon in the system tray. This tool is used for PC Cards as well as for all removable devices. In most cases, it is a good idea to use this tool to stop the driver of a particular device before unplugging it from the system. This prevents system errors and data loss by allowing the system to elegantly finish using the device, clear all related buffers, and disable the drivers and dependent services.

Card services are installed automatically when Windows 2000 is installed onto a HAL-supported notebook or portable computer (or a desktop computer with a PC Card slot device). Once installed, most of the tasks and processes required to manage and enable PC Card support are handled automatically by Windows 2000. Your primary control is through the "Unplug or Eject Hardware" icon in the system tray. Through this icon (right-click to access a pop-up menu or double-click to open the applet), you can instruct the system to stop using and release control of the PC Card device so it can be removed. Once a new card is inserted, the system will automatically detect and enable it.

VIDEO ADAPTERS

The video or display capabilities of Windows 2000 are often the most visible function of the system. All interaction with the operating system by a user requires some form of visual display to guide the placement of the mouse insertion point or to offer feedback from keyboard use (or visual-to-audio or visual-to-tactile conversion for the visually impaired). The features and functions of the Windows 2000 display mechanism are controlled through the Display applet. The driver for the video adapter is usually installed during system installation via Plug and Play and the Add/Remove Hardware applet. Once a driver is present, it can be reconfigured or updated through the Display applet (that is, by clicking the Advanced button on the Settings tab, then clicking the Properties button on the Adapter tab).

Windows 2000 also supports multiple displays. In fact, you can configure up to nine monitors to display a single extended desktop. There are a few limitations on the multiple display feature:

- Only PCI (Peripheral Component Interconnect) or AGP (Accelerated Graphics Port) devices are supported.

- Video adapters built into the motherboard can be used—but only as secondary adapters—providing that the BIOS (basic input/output system) will allow the on-board adapter to function when an expansion card adapter is present.

- Windows 2000 must be installed with a single adapter first; then other adapters can be physically added, and drivers can be installed and configured.

To configure multiple displays, first install all video adapters and attach monitors. Then, follow these steps:

1. Open the **Display** applet.

2. Select the **Settings** tab.

3. Depending on how many adapters are installed, monitor icons with numbers on them will be displayed. Drag these icons to match your desired display arrangement.

4. Select the primary monitor icon (that is, number 1).

5. Select the display adapter from the pull-down list for this monitor.

6. Set the color depth and display resolution.

7. Select the secondary monitor icon (that is, number 2).

8. Repeat Steps 5 through 7 for each device.

CHAPTER SUMMARY

❐ In this chapter, you learned about the Microsoft Management Console, Task Scheduler, and Control Panel. The MMC is an interface into which consoles, snap-ins, and extensions are loaded to create custom administration tools. The MMC provides an interface to the majority of system tools that you can use to manage Windows 2000, as well as create your own custom consoles to manage applications and services that are specific to your system.

❐ The Task Scheduler is a fully GUI-interactive scheduling service with a wide range of control features for local and remote scheduling. With these two powerful tools, you can effectively manage a local system or an entire network.

❐ The Control Panel contains various applets and tools that are used to manage a Windows 2000 system. This chapter surveyed the most commonly used Control Panel tools.

❐ Finally, this chapter explored the processes of installing hardware, using hardware profiles, dealing with PC Cards, and configuring multiple displays, using the tools introduced in the chapter.

KEY TERMS

applet — A tool or utility found in the Control Panel that typically has a single focused purpose or function.

author mode — The condition of a console that allows users to add and remove snap-ins, create new windows, view the entire console tree, and save new versions of the console.

console — The collection of snap-ins and extensions saved as an .msc file loaded into the MMC that offers administrative controls.

Control Panel — The collection or organization of tools and utilities, called applets, within Windows 2000 (and Windows 95, 98, and Windows NT) where most system- and hardware-level installation and configuration take place.

device — A physical component either internal or external to the computer that is used to perform a specific function. Devices include hard drives, video cards, network inter- face cards, and printers.

direct memory access (DMA) — A channel used by a hardware device to access memory directly, bypassing the CPU. Windows 2000 supports eight DMA channels, numbered 0 through 7.

docking station — An expansion device for notebook computers that allows additional peripherals to be used by the portable computer. Typically, a docking station is used to add a full-sized monitor, keyboard, mouse, CD-ROM drive, tape backup, or printer to a notebook computer.

driver — A software element that is used by an operating system to control a device. Drivers are usually device-specific.

extension — A component that adds additional functions to a snap-in.

hardware profile — A collection of custom device settings used on computers with changing physical components.

I/O port — The section of memory used by the hardware to communicate with the operating system. When an IRQ is used, the system checks the I/O port memory area for additional information about what function is needed by the device. The I/O port is represented by a hexadecimal number.

interrupt request (IRQ) — The interrupt request level that is used to halt CPU operation in favor of the device. Windows 2000 supports 16 interrupts, namely IRQ 0 through 15.

memory page — *See* page.

Microsoft Management Console (MMC) — The standardized interface into which consoles, snap-ins, and extensions are loaded to perform administrative tasks.

page — A 4 KB chunk of data, which is the smallest unit managed by the Virtual Memory Manager. Pages are moved around physical RAM and to and from the paging file.

paging file — A file stored on a hard drive, employed by the Virtual Memory Manager as a temporary storage container for inactive memory pages. Its name is Pagefile.sys.

PC Cards — The modern name of the PCMCIA technology. PC Cards are credit card- sized devices typically used to expand the functionality of notebook or portable computers.

PCMCIA (Personal Computer Memory Card International Association) Cards — The older name for the technology now labeled PC Cards. PCMCIA Cards are credit card-sized devices typically used to expand the functionality of notebook or portable computers.

Plug and Play — A technology that allows an operating system to inspect a device, determine exactly what the device is, install the correct driver, and enable the device— all without user interaction. Plug and play simplifies the addition and removal of hard- ware and can often offer on-the-fly reconfiguration of devices without rebooting.

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service — A software element used by the operating system to perform a function. Services include offering resources over the network, accessing resources over the network, print spooling, etc.

snap–in — A component that adds control mechanisms to a console for a specific service or object.

Task Scheduler — The component of Windows 2000 used to automate the execution or launch of programs and batch files on the basis of time and system conditions.

user mode — The condition of a console that prevents adding or removing snap-ins or resaving the console file.

virtual memory — The combination of physical RAM and pagefile space used by the operating system to grant a larger collection of usable memory to processes.

wizard — A tool or utility that has an interactive step-by-step guide to walk you through a complex or detailed configuration process.

REVIEW QUESTIONS

1. Which tool is the primary interface through which most Windows 2000 administrative tasks are performed?

   a. Control Panel

   b. Microsoft Management Console

   c. Task Scheduler

   d. My Computer

2. What are extensions used for in the context of the MMC?

   a. to alter the MMC display

   b. to restrict controls based on user accounts

   c. to add additional functionality to standalone snap-ins

   d. to allow remote administration of services and objects

3. Where do snap-ins originate? (Choose all that apply.)

   a. Windows 2000

   b. other Microsoft software products

   c. Windows 2000 Resource Kits

   d. independent software vendors

4. Using snap-ins, you can create .msc consoles that include only the functionality you need. True or False?

5. Which .msc mode allows users to create new windows but prevents them from viewing some parts of the console tree?

   a. Author mode

   b. User mode: Full Access

   c. User mode: Delegated Access/Multiple Windows

   d. User mode: Delegated Access/Single Window

6. Which of the following are tools found in the Administrative Tools menu? (Choose all that apply.)

   a. Computer Management

   b. My Computer

   c. Event Viewer

   d. Utility Manager

7. What are the methods by which the functions offered by an MMC can be accessed? (Choose all that apply.)

   a. Start, Programs, Administrative Tools

   b. Utility Manager

   c. Control Panel's Administrative Tools icon

   d. Load snap-ins into MMC

8. Which of the following can trigger the launch of an automated event? (Choose all that apply.)

   a. User logon

   b. System idle

   c. Exact time

   d. System startup

9. A scheduled task can function only on the system where it was defined. True or False?

10. A task can be configured so that only specific users can alter its scheduled parameters. True or False?

11. Tasks are automatically deleted after they execute by default. True or False?

12. Which applet is used to configure ToggleKeys and SoundSentry?

    a. Sound and Multimedia

    b. Keyboard

    c. Accessibility Options

    d. System

13. If you want to use the numeric keypad to control the mouse insertion point movement, which applet must you open to configure this option?

    a. Sound and Multimedia

    b. Keyboard

    c. Accessibility Options

    d. System

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14. Which of the following actions can the Add/Remove Hardware applet be used to perform? (Choose all that apply.)

    a. troubleshoot an existing device

    b. disable a PC Card driver before it is removed

    c. configure multiple display layout

    d. uninstall a device driver

15. Which applet should you use to add Windows components distributed on the Windows 2000 Professional CD?

    a. System

    b. Add/Remove Programs

    c. Windows 2000 Resource Kit

    d. Regional Settings

16. The Display applet can be used to perform which of the following functions? (Choose all that apply.)

    a. install a new adapter device driver

    b. set the screen saver timeout period

    c. enable Active Desktop

    d. define a custom color scheme

17. Web zones are used to define custom colors, sounds, and icons on the basis of the source of the Web resources. True or False?

18. Where can you define the utilities to handle e-mail, newsgroups, online calls, and contacts?

    a. Folder Options

    b. System

    c. Add/Remove Programs

    d. Internet Options

19. Home/Office Desk, Presentation, and Portable/Laptop are examples of predefined _____.

    a. Hardware profiles

    b. User profiles

    c. Power Options settings

    d. System profiles

20. Through which applet can you access troubleshooting help for an audio card? (Choose all that apply.)

    a. Add/Remove Hardware

    b. System

    c. Sounds and Multimedia

    d. Accessibility Options

21. Which applet can be used to change domain or workgroup membership?

    a. System

    b. Add/Remove Hardware

    c. Accessibility Options

    d. Workgroup Settings

22. When Windows 2000 is installed, it creates a paging file that is how much larger than the amount of physical RAM present on the system?

    a. one and one–half times

    b. two times

    c. two and one–half times

    d. three times

23. When a STOP error occurs, what can the system do? (Choose all that apply.)

    a. write an event to the system log

    b. send an administrative alert

    c. write a memory dump file

    d. reboot the system

24. Which tool is used to ensure that a newly installed device is functioning properly?

    a. System

    b. Add/Remove Hardware

    c. Device Manager

    d. Administrative Tools

25. Which of the following are system resources that are often in contention with non–Plug and Play devices? (Choose all that apply.)

    a. Paging file space

    b. I/O Port

    c. Priority CPU cycles

    d. IRQ

HANDS-ON PROJECTS

Project 3-1

To create an MMC console for system management:

1. Select **Start**, then **Run**, type **MMC**, and press **Enter**.
2. Select **Add/Remove Snap-in…** from the Console menu.

3

3. Click **Add**.

4. Locate and select **Computer Management** from the Add Standalone Snap-in dialog box.

5. Click **Add**.

6. Select **Local computer**.

7. Click **Finish**.

8. Click **Close**.

9. Select the **Extensions** tab.

10. Ensure that the **Add All Extensions** check box is selected and examine what each extension does in the Description pane of the dialog box.

11. Click **OK** to return to the MMC. Notice that the Computer Management snap-in is listed in the console tree.

12. Maximize the console root window by double-clicking its title bar.

13. Select the **Save As** command from the Console menu.

14. Change to the directory where you want to store the console file.

15. Give the console file a name, such as **Compmgt.msc**. Click **Save**.

16. Select **Exit** from the Console menu.

Project 3-2

To create an automated task:

1. Open the Control Panel (**Start**, **Settings**, **Control Panel**).

2. Double-click the **Scheduled Task** icon.

3. Launch the Task Scheduler Wizard by double-clicking **Add Scheduled Task**.

4. Click **Next**.

5. Select **Backup** from the list.

6. Click **Next**.

7. Select **Daily**.

8. Click **Next**.

9. Set the time to three minutes from the present.

10. Click **Next**.

11. If you want to launch the task with another user account as the context, provide the username and password. Otherwise, click **Next**.

12. Click **Finish**.

13. Wait the remainder of the three minutes to see Backup launch automatically.

Project 3-3

To add a Windows component:

1. Open the **Control Panel** (**Start**, **Settings**, **Control Panel**).
2. Open the **Add/Remove Programs** applet (double-click the applet's icon).
3. Select **Add/Remove Windows Components**.
4. The Windows Components Wizard appears, showing the list of available components. Locate and select **Other Network File and Print Services**. Click **Next**.
5. Insert the Windows 2000 Professional CD-ROM when prompted, if necessary.
6. Click **Finish**.
7. Close the Add/Remove Programs applet by clicking **Close**.

Project 3-4

To set the calendar date, clock time, and time zone for the system:

1. Open the **Control Panel** (**Start**, **Settings**, **Control Panel**).
2. Open the **Date/Time** applet (double-click the applet's icon).
3. Use the pull-down list to select the correct month.
4. Use the up and down arrows to select the correct year.
5. Select the current day's date from the displayed month calendar.
6. Click the hours in the time field below the analog clock. Use the up and down arrow buttons to adjust the hour to the current time.
7. Select the minutes in the time field. Use the up and down arrow buttons to adjust the minutes to the current time.
8. Select the seconds in the time field. Use the up and down arrow buttons to adjust the seconds to the current time.
9. Select the AM/PM designation in the time field. Use the up and down arrow buttons to adjust the designation to the current time.
10. Select the **Time Zone** tab.
11. Use the pull-down list to select the time zone for your area.
12. Click **OK** to close the Date/Time applet.

Project 3-5

To create a custom sound scheme:

1. Open the **Control Panel** (**Start**, **Settings**, **Control Panel**).
2. Open the **Sounds and Multimedia** applet (double-click the applet's icon).
3. Use the Scheme pull-down list to select **Windows Default**.
4. If prompted to save the previous scheme, click **No**.

5. Select the **Asterisk** item from the list of Sound Events.

6. Use the **Name** pull-down list to select **[None]**.

7. Select the **Exit Windows** item from the list of Sound Events.

8. Use the **Name** pull-down list to select **Windows Logoff Sound**.

9. Click the **Save As** button.

10. Give the sound scheme a name, such as **Windows Example 1**. Click **OK**.

11. Click **OK** to close the Sound and Multimedia applet.

Project 3-6

To configure a Windows 2000 Professional system for standalone home use:

1. Open the **Control Panel** (**Start**, **Settings**, **Control Panel**).

2. Open the **System** applet (double-click the applet's icon).

3. Select the **Network Identification** tab.

4. Click the **Network ID** button.

5. On the Network Identification Wizard, click **Next**.

6. Select **This computer is for home use and is not part of a business network**, then click **Next**.

7. Select **Windows always assumes the following user has logged on to this computer**.

8. Select a username from the pull-down list.

9. Provide the appropriate password in both the Password and Confirm password fields, then click **Next**.

10. Click **Finish**.

11. Click **OK** on the message that states you must reboot for the changes to take effect.

12. Reboot the computer (**Start**, **Shutdown**, **Restart**, **OK**).

Project 3-7

To create a hardware profile for a mobile computer:

1. Open the **Control Panel** (**Start**, **Settings**, **Control Panel**).

2. Open the **System** applet (double-click the applet's icon).

3. Select the **Hardware** tab.

4. Click the **Hardware Profiles** button.

5. Select an existing hardware profile.

6. Click **Copy**, provide a new name, such as **Mobile Profile – no NIC**, click **OK**.

7. Click **OK** to close the Hardware Profiles dialog box.

8. Click **OK** to close the System Properties dialog box.

9. Reboot the system (**Start**, **Shutdown**, **Restart, OK**).

10. If prompted, select the new hardware profile, using the arrow keys and pressing **Enter**.

11. Log on to the system (**Ctrl**+**Alt**+**Delete**, provide a username and password if applicable).

12. Open the Device Manager (**System** applet, **Hardware** tab, **Device Manager** button).

13. Expand the **Network adapters** item by clicking on the **plus** sign.

14. Select the listed NIC.

15. Right-click the NIC, then select **Properties** from the menu.

16. Change the Device Usage pull-down menu to read **Do not use this device (disable)**.

17. Click **OK**.

18. Close the Device Manager by clicking the **Close** button in the upper-right corner of the title bar.

19. Click **OK** to close the System Properties dialog box.

Now your system has a normal hardware profile and a profile that has the NIC disabled for use when not connected to the network. Upon each reboot you can select the appropriate hardware profile.

Project 3-8

To monitor and manage a device via the Device Manager:

1. Open the Administrative Tools by selecting **Start**, **Settings**, **Control Panel**, then double-clicking the **Administrative Tools** icon.

2. Launch the **Computer Management** tool by double-clicking its icon.

3. Select the **Device Manager** of the **System Tools** section of the **Computer Management** tool.

4. Double-click the **DVD/CD-ROM drives** item to expand its contents.

5. Select one of the items that appears.

6. Select **Properties** from the **Action** menu.

7. Notice the Device status message, which should state that the device is working properly. If there was a problem with this device, information about the problem would be listed and you'd be instructed to press the **Troubleshooter** button to access the troubleshooting wizard.

8. Select the **Properties** tab. This is where hardware device-specific settings can be made.

9. Select the **Driver** tab. This is where information about the current driver is presented and where the current driver can be updated, replaced, or removed.

10. Click **OK**.

11. Close the Computer Management tool.

3

Project 3-9

To enable multiple languages and locales on a computer and use them to compose a document in multiple languages:

1. Open the Control Panel selecting **Start**, **Settings**, **Control Panel**.
2. Open the **Regional Options** applet by double-clicking its icon.
3. Select the **Input Locales** tab.
4. Click **Add**.
5. Under Input Locale select **French (France)**.
6. Under Keyboard layout/IME select **French**.
7. Click **OK**.
8. Click **OK**.
9. Launch **Notepad** by selecting **Start**, **Programs**, **Accessories**, **Notepad**.
10. Type **This is English. 123456789**. Press **Enter**.
11. Click the locale icon in the taskbar, then select **French**.
12. Type **This is French. 123456789**. Notice that number keys appear as special French characters instead of English numerals.
13. Click the **Locale** icon in the taskbar, then select **English**.
14. Close Notepad by selecting **Exit** from the **File** menu. Click **No** when prompted to save changes.

Project 3-10

To change locale settings:

1. Open the Control Panel selecting **Start**, **Settings**, **Control Panel**.
2. Open the **Regional Options** applet by double-clicking its icon.
3. Select the **Numbers** tab.
4. Make any changes you would like for the display of numbers.
5. Select the **Currency** tab.
6. Make any changes you would like for the display of currency.
7. Select the **Time** tab.
8. Make any changes you would like for the display of time.
9. Select the **Date** tab.
10. Make any changes you would like for the display of dates.
11. If necessary, reset the Date, Time, Currency, and Numbers tabs to their original settings.
12. Click **OK**.

CASE PROJECTS

1. You need to delegate administrative tasks to nonadministrative users. However, you are concerned about granting too much power to users. What can you do?

2. You want to participate in the SETI@home project (*http://setiathome.ssl.berkeley.edu/*). However, the utility consumes most of the CPU cycles when it is active. How can you participate in this project but still be able to get other work done on your computer?

3. You have a notebook computer with a docking station. The docking station hosts a 21-inch monitor, a DVD drive, a tape backup, and a color printer. What is the best method to enable your notebook computer to use the devices on the docking station without having problems when not connected to the docking station?

4. You work in a graphics design group. You often have six or seven applications open at one time while editing, creating, or working on design projects. You also flip back and forth between applications very frequently, mainly just to see the graphics displayed. With the capabilities of Windows 2000 and an unlimited budget, what can you do to improve your visual space?